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TABLE OF CONTENTS.

PAGE.

EDITORIAL ARTICLE:—Some Timely Lessons from the Forests of India... 191
The Flora of the California Coast Range.—I.....*Carl Purdy.* 192
A Botanical Journey in Texas.—IV.....*E. N. Plank.* 193
PLANT NOTES:—Magnolia stellata. (With figure.)..... ... 194
CULTURAL DEPARTMENT:—Culture of the Garden Bean.... .... *Will W. Tracy.* 194
Flowers of the Season.....*J. N. Gerard.* 196
Notes from Baden-Baden.....*Max Leichtlin.* 196
Canna Notes.....*G. A. Woolson* 196
The Lily Garden.....*C. L. Allen.* 196
Saxifraga crassifolia, Menyanthes trifoliata, Stylophorum diphyllum, *Edward J. Canning.* 197
Pampas Grass, Viola pedata.....*G. W. O.* 197
Tussilago Farfara.....*Wilfred A. Brotherton.* 197
CORRESPONDENCE:—The California Frosts.....*Charles H. Shinn.* 198
The Evonymus Scale in Japan.....*Professor T. D. A. Cockerell.* 198
Notes from West Virginia.....*Danske Dandridge.* 198
Maple Sugar in Vermont.....*Professor F. A. Waugh.* 198
RECENT PUBLICATIONS 199
NOTES..... 200
ILLUSTRATION:—Magnolia stellata in a New Jersey Garden, Fig. 31..... 195

Some Timely Lessons from the Forests of India.

INDIA has given to the world the most conspicuous example of a national forest policy adopted over a vast area. It is not, like Europe, a forest-producing country throughout, and while its tropical and subtropical climate differs widely from our own, we can pick out climatic parallels between portions of India and of the United States more readily than we can between the United States and Europe. India contains evergreen forests of great density and luxuriance, and large areas like our own great interior plain, where no natural forest growth can exist, and between these extremes we find every variety of condition in regard to water-supply, evaporation, etc., most of which can be repeated in our own country. Under the sway of the Mohammedans, which lasted 750 years, the forests of India were recklessly destroyed, chiefly by fire, to provide grazing ground for cattle, and under the British rule which followed vast areas of Government land were alienated, only a small portion of which was fit for agriculture, and as herds multiplied more forests were wiped out by fire. Meanwhile the large construction of railways and the increased demand for timber and fuel consumed the forests with incredible rapidity under the management of the lumber speculators and contractors, who had present profits in view, with no thought of the future. Americans need only look at home to see how forests can be devastated simply by clearing lands for cultivation, regardless of the future, and by unchecked logging and generally careless treatment. The analogy between the forest conditions and the forest abuses of the two countries is so clear that Mr. Berthold Ribbentrop, the present efficient Inspector-General of Forests in India, during a recent journey in the United States wrote for our instruction a brief statement of some of the salient features of the Indian forest policy. This paper is too long to publish entire in this journal, but we select a few points in the recent forest history of India which will, perhaps, be found specially instructive to American readers.

When the Indian Government began to find the timber fail for local public works it recognized at once the necessity of a more conservative use of forest products, but it was years before the people of the country recognized the indirect value of forests upon agriculture and came to believe that no high degree of civilization can exist permanently without some systematic and adequate forest management. Our own country is now passing through this educational stage—that is, the people at large are only beginning to learn these truths. Just at this critical period the British Government secured the services of Mr. (now Sir Dietrich) Brandis, who recognized at once that conservative management could only be initiated by the Government, the greatest landlord of the empire, and that it was necessary to acquire and maintain possession of a large area of forest-land and secure legal and executive powers to protect it. This was an uphill struggle, largely because there were so many prescriptive rights to use the forest for various purposes. Without explaining the interesting legal complications involved, it is sufficient to say that Mr. Brandis preferred to make an early settlement with the holders of forest rights and take possession under a modified condition of possession rather than enter into long and uncertain legal controversies for a more complete ownership. Our own Government would meet with no such obstacles, for no one has rights of pasturage or rights to cut a given amount of timber on our national forest domain. What Mr. Brandis did then was simply to settle those rights—that is, to define and limit them and to prevent any increase of them in the future. Under these laws 80,000 square miles have up to date in India been formed into permanent forest reserves, in which the rights of the state and the adverse rights of the communities and private persons have been finally determined. Fifty thousand square miles more are in process of settlement, making 130,000 square miles in all.

As soon as it was resolved to protect the forest properties of the state and exploit them under direct Government supervision, a few officers were appointed with a staff of subordinates. These officers were generally selected from the military or medical staff, perhaps because they had some knowledge of botany or were considered specially fit for some other reason. A knowledge of technical forestry was not insisted upon then, and Mr. Brandis was the first to bring such knowledge to bear on the question. As soon as he was appointed Inspector-General he saw the need of technically trained assistants, and he at once took steps to organize a technical department, and brought over two trained German forest officers in 1866—Messrs. Schlich and Ribbentrop—both of whom have been his successors in office, and at the same time he made arrangements for the professional education of young Englishmen in France and Germany. Before these trained officers were available the staff was augmented by the appointment of young officers in India, who began their service in lower grades, and were promoted as they learned by experience. Later on, however, and especially since the establishment of the forest school at Cooper's Hill, every addition to the force has been a trained forester, except on one occasion, when a large number of officers were suddenly needed to take charge of new forests. The number of officers in the controlling grades now amount to two hundred, and they have the prospect of regular promotion and pension. In 1878 a forest school was also established in one of the north-western provinces at Dehra Dun, in which the education was at first superficial, but since 1887 it takes rank with the best institutions for educating a subordinate staff in any country of the world. The support of this school and the rest of the forest establishment costs four millions of rupees a year, and this expenditure must soon be largely increased, as the subordinate staff is now too small to keep pace with the ever-increasing work. On the other hand, the revenue has more than kept pace with the growth of the expenditure. The net average surplus for five successive five-year periods, beginning with 1867-8 and ending with 1891-2, is as follows: (1) 1,339,000 rupees; (2) 2,129,000 rupees; (3)

2,689,000 rupees; (4) 3,848,000 rupees; (5) 6,186,000 rupees; the cash surplus for the year 1891-2 being about seven and a half million rupees, with a tendency to grow, in the face of constantly increased expenditures for fire protection, constitution of reserves, amelioration of forest estates, surveys, working-plans, road-building and the like. In addition to this annually increasing direct income, the Government forests have yielded immense quantities of products to right-holders and other privileged persons. The annual value of this outside yield represents, at least, as much as the entire amount spent on the whole forest establishment. Besides this, the value of a well-ordered forest area to the country which lies below it can never be estimated. It is an interesting fact, however, that in one district in the Punjab, lying at the foot of a small mountain range, comprised of friable sandstone, the Government suffered an annual loss from land revenues alone amounting to 90,000 rupees a year, owing to the devastation of the fields which followed the destruction of the forests over a comparatively small mountain area. Losses like this are reduced every year since forest destruction has been arrested. Besides this, the forest improves steadily and the increase of its capital value is enormous, although it can be hardly expressed in figures. The sum of the matter is that, although in India ten million rupees are spent every year in administering the state forests, a liberal and growing surplus is realized from the annual growth of the produce, and besides this, large amounts are harvested by right-holders, the agricultural and climatic conditions of the country are substantially benefited, while the forest is not infringed upon either in area or immature stock, but is steadily growing in productive capacity.

We are certainly justified in taking heart and hope at what has been accomplished in India during thirty years, for there is no reason to doubt that the same thing can be done in America, where the Government still holds possession of large timber areas. President Gibbs, of the National Academy of Science, in his reply to the request of the Hon. Hoke Smith, Secretary of the Interior, who had asked that body to undertake an investigation of the subject of forestry in this country, has stated the points to be considered by the Commission as follows:

(1) The question of the ultimate ownership of the forests now belonging to the Government—that is, what portions of the forest on the public domain shall be allowed to pass either in part or entirely from Government control into private hands?

(2) How shall the Government forests be administered so that the inhabitants of the adjacent regions may draw their necessary forest supplies from them without affecting their permanency?

(3) What provision is possible and necessary to secure for the Government a continuous, intelligent and honest management of the forests of the public domain, including those in the reservations already made or which may be made in the future?

Most of these questions have received an actual and practical answer in the management of the Indian forests. It is admitted that the social conditions of the two countries are entirely different; but so are the climatic conditions of India and Europe, and yet Sir Dietrich Brandis and his successors have proved that the laws of forest growth are the same the world over, so that forests in India can be made to grow in productiveness and in value by adopting the same principles upon which the successful forestry of Europe has been founded. In the same way the broad principles of law upon which this forest policy has been built do not differ in different lands. Here, too, there must be a trained corps of foresters. Here, too, the Government, the only permanent possessor of the soil, must manage its own forests if there is to be any stable policy. Here, too, there must be an adjustment between local needs and the rights of the commonwealth. If once public opinion is educated up to adopting and enforcing such legislation as may be recommended by experts of recognized ability, we shall soon have legislation looking toward the selection of suitable tracts for conservative forest treatment. If the Government will hold, protect and manage these national forests, disposing only of their annual increase, the time is not far distant when there will be a paying demand for these products, and when private forest owners will realize that it is to their interest to follow the example of the Government and place their forest property under similar control.

The Flora of the California Coast Range.—I.

THE Coast Range is the general name for the great mountain system which stretches along the coast from southern California to Puget Sound. It is not a continuous range, but a broken mass of parallel ridges from forty to seventy miles wide, with many other chains transverse to the general trend of the range, and enclosing numerous valleys, large and small, of widely different altitudes. Great streams rising in the Sierra cut through it here and there, while other streams rising in the range itself pour directly into the Pacific at various angles, and through the depressions where they flow fogs and wind pour in to modify greatly the local climates. At some points broad plains or low rolling hills lie next to the coast, and at others high mountains along the ocean shut out the wind and fog from the country behind them. San Francisco Bay exercises a marked influence on the climate of a large area, and all these factors tend to produce diversity of temperature and moisture in an apparently capricious way in places near together; in fact, no two places have the same climate and rainfall. In the Sierra Nevada the frostless belt lies at a certain altitude; in the Coast Range there is no warm belt, but isolated warm spots which depend on altitude, prevailing wind, fog and exposure. The result is that the climates here can only be ascertained by experience.

The rainfall is even more capricious than the temperature. In every rain there is a considerable difference in the precipitation between Ukiah and the Insane Asylum, three miles away across an open valley, being invariably less at the latter place. Little Lake, twenty miles from here, has a greater rainfall. Mendocino City, on the coast, has an annual rainfall of more than fifty inches, while seventy miles away, Colusa County, in the Sacramento Valley, has eight inches, and at points in Shasta County, at the head of the Sacramento Valley, the rainfall has been as great as 120 inches. The geological formation of the ranges and the character of soils constantly vary, and in the rougher sections they vary widely at very short intervals. Under such conditions the flora of the Coast Range cannot be other than interesting, and it is hardly probable that there is a more captivating field for the botanist in the world. Plants are much localized, and frequently found there out of their usual range. To the enthusiast in natural science the study of these endless variations and their causes is a source of constant pleasure.

Nowhere in the range is there greater variety than in the area comprised within Mendocino and Lake counties. Here we have a narrow table, or hill-slope, next the ocean originally covered with Pinus muricata, sand dunes and salt lagoons. A few miles back high table-lands lie between the deep-cut river channels, covered with a tangle of low shrubbery. Up the river cañons on the ocean side, and fringing the valleys, the great coniferous forest begins, and after a few miles the Redwood begins and stretches to the tops of the range which, at twenty miles from the sea, forms a barrier 2,000 feet high between the coast and the interior. This barrier range, diversified by masses of Douglas Spruce, Oak woods, thickets of Chemisal or mixed shrubs, open grassy slopes, tiny mountain meadows or wide enclosed valleys, and with small patches of Redwood in cañons or cool slopes on its landward side, is a most interesting field for the botanist. Midway of Mendocino County a prominent ridge crosses the mountain range, towering up from five thousand to six thousand feet above its lofty neighbors, snow-capped until summer, its lower slopes covered with forests of Yellow

Pine or Sugar Pine. This is the San Hedrin Mountain, while farther east Mount Hull, Snow Mountain and Mount St. John are higher still, each having a geology and flora peculiarly its own. Rising at the base of this range Eel River flows north-west to the ocean, while near by the Russian River flows to the south. The banks of the first are rugged and rich with conifers, while the basin of the latter is the home of a large and varied family of Oaks. East of the Russian River valley is another great barrier range, smooth and round topped, its higher slopes a vast even growth of brush, its lower slopes grassy and dotted with Oak woods, and its cañons treasure-houses to the lovers of trees and flowers. High on these shrub-covered mountains are little vales which are also mines for the flower lover.

Beyond these lies Clear Lake, thirty-five miles long, surrounded by high mountains, and although 1,300 feet above the level of the sea, it furnishes congenial homes for Orange groves. Further to the east another lofty Pine-covered range divides Clear Lake from the headwaters of the Sacramento and offers a region, half-alpine, rough and hard, yet of surpassing interest. I have been collecting in this wonderfully diversified region for sixteen years, and yet there are numberless fields that I have not explored, and every year I am reminded how little I really know of them. I shall try to convey some faint idea of the characteristic trees and flowers of some of these sections, always keeping in mind that twenty other such belts might be cut from the Coast Range, each quite as interesting to the naturalist and without any danger of monotony, while the whole series terminates at the north in that wild Olympic range between Puget Sound and the ocean, one of the most striking and least-known of our nation's possessions.

Ukiah, Calif. *Carl Purdy.*

A Botanical Journey in Texas.—IV.

LEAVING Marfa very early the thirteenth day of June, we arrived in the afternoon of the same day at El Paso, one of the best-known cities of Texas, situated at the extreme western limit of the state. The city contains about twelve thousand inhabitants. It is the capital of a county of the same name, which covers eight thousand four hundred and sixty square miles. El Paso is near the one hundred and sixth meridian, near the thirty-second parallel, and the average annual rainfall for the last nine years is about ten and one-half inches.

Across the river, and nearly opposite El Paso, is the Mexican city, Cuidad Juarez, the two cities standing near the head of the "Pass," a nearly level valley extending many miles down the river, and probably an earlier lake-like expansion of it. Centuries ago the beauty of the Pass, and its adaptability to irrigated agriculture, led to the establishment of a Spanish colony and mission at Juarez, which is one of the oldest cities of America, and Baron Humboldt, who visited this locality early in our century, speaks in praise of the Pass, of the Mission, of the vineyards there and of the Mission grape.

The vicinity of El Paso is one of the principal seats in Texas of successful agriculture by irrigation. At the river rapids, about a mile above the city, low dams have been built letting the water of the river into the main ditches on each side of it for distribution to the fields of grain, vegetables and fruit. At this immediate point most of the farming is done on the Mexican side of the river. But on the American side, farther down the river, and near Ysleta, fields of Wheat, Barley, Corn and other grains are common. Alfalfa, the great forage plant of irrigated lands, is the commonest farm crop. Its growth on such fields is wonderful, three or four cuttings of it being made in a season. At Juarez are venerable Pear-trees, two or more feet in diameter, larger Apricot trees than I had seen before, vineyards, Apple orchards, and occasionally a Quince-tree, and this where cultivated trees, as well as cultivated smaller plants, live only by irrigation.

While in Mexico I visited the extensive orchards and vineyards of Dr. Alexander, a sturdy hospitable German of the old school, who bought his grange of a son of the priest who entertained Baron Humboldt in his home at the time of his visit to the Pass. The vineyards of Dr. Alexander contain about thirty thousand vines of the Mission Grape, which was probably introduced into this country by the Spaniards. Little is known of its origin or of its introduction to America. The fruit when ripe is dark purple in color, of fair size, well clustered and full of thick sweet juice, fermenting into a rich strong wine. Its leaves in general outline resemble those of the southern Muscadine, but they are larger and more deeply lobed, the larger leaves sometimes approaching in form those of our common Ampelopsis. The trunk readily takes a tree form and requires no trellis. The vine has simply adapted itself to the climatic conditions of the country to which it has been transferred, since no poles for trellising grow here. The grapes begin to ripen early in the month of August. September is the wine-making month. It is said that the wine would be better if the grapes remained on the vines until November. But for obvious reasons it is necessary to gather them much sooner.

On an average each vine yields an annual crop of ten pounds of grapes. The pure juice of fourteen pounds of grapes will afford a gallon of ripe wine. A glass of this wine kindly proffered by Dr. Alexander, although but ten years old, was well matured for its age, healthful, full of good cheer, and vivacious. Long experience has led my host to conclude that the Mission Grape is the only variety that is well adapted to the conditions of climate and soil which exist in the El Paso region, and that will afford at the least cost of production a good potable wine.

In the streets, yards and parks of El Paso I saw growing western Cottonwood, Silver Poplar, Lombardy Poplar, Willow Catalpa in handsome tree form, Barbadoes Flower Fence, or, as some people call it, Bird of Paradise Tree (Cæsalpinia pulcherrima); Jerusalem Thorn, Yellow Locust (Robinia), Silk Tree (Albizzia), Mexican Elder (Sambucus), China Tree (Melia), Paradise Tree (Ailanthus), Wild China (Sapindus), Osage Orange (Ioxylon), English Ivy (Hedera), Virginia Creeper (Ampelopsis), Red Mulberry, Morus, and others. There are thousands of acres of land in this great valley now vacant, but capable, under irrigation, of becoming highly productive. Nature is doing all that is in her power to assist in redeeming and fitting the alkaline flats for agriculture. She is employing several Hoffmannseggias, some Daleas, a half-dozen species of Atriplex, three or four Amaranths, a species of Lepidium, Suædas, Bigelovias, Helianthi, Sesuvium, Trianthema, coarse Grasses and Sedges and other plant laborers, to change and purify the soil by their living, and by their death and decay to add to its permanent fertility. The refuse-matter of the streets and stables should be utilized for the same purpose, and then the only great need would be a permanent supply of water for irrigation.

As it is now, irrigation at El Paso is far in advance of actual agriculture. Probably three times the amount of farm and garden products might be raised with little additional expense for water. But the river-bed itself is sometimes as dry and dusty as the unsprinkled streets of the city. Irrigation is yet in its infancy. A dam sufficiently strong to hold the accumulated floods of the Rio Grande and of other large rivers would involve an expense of millions of dollars and heavy damages for overflows, and could exist here only by international agreement. In time such structures might be worth far more than the cost of building them.

The general features of the flora around El Paso are somewhat peculiar. Species of the Pea family have decreased, while species of the much smaller Malva family have increased in numbers. Species of Compositæ, especially shrubby species, are very numerous. Cruciferæ hold their ground, species of Lesquerella being unusually abundant. Certainly two, perhaps three, species of Agave rep-

resent the Amaryllids. A Dasylirion, several Yuccas and a few smaller species of other genera stand for the Lily family. Amaranths and Chenopods give character to the vegetation of the alkaline flats, while species of Prosopis, a Baccharis and "Cachamilla" Arrow-wood, Pluchea borealis, not a very good Pluchea, though as well in that genus as anywhere, attend them.

Wislizenia refracta, of the Caper family, was met here for the first time, and in the prime of its flowering. It is a plant of queer habit and of queer ways; sometimes spreading, it is usually erect and two to four feet tall. It bears its flowers in long terminal racemes. In fruiting the peduncles bend backward; hence the significance of the specific name of our plant.

Biscutella Wislizeni, a rather handsome Crucifer, grows in the damp sands of the "draws" of the mesas and in the mountain dells. This species, too, wears a peculiar habit which makes its recognition easy. It bears its rather large white flowers in pairs. They are succeeded by rounded pods, so as to appear, as its generic name signifies, like two little shields. It is the "Spectacled Plant" of Dr. Havard's catalogue of the plants of southern and western Texas.

Martynia althæfolia is common in fertile places. This species produces rather large flowers, which are purplish on the outer and yellow-spotted on the inner side. The plant sometimes spreads over a square yard of ground. Atriplex canescens, which is common from the lower Rio Grande far northward, has not missed this locality. Several other species of that genus have settled here. A. elegans appears to be the beauty and the pet of the genus as seen around El Paso.

Helianthus ciliaris, the odd one of our species of that genus, is one of the chief groups of plant-workers that Nature is employing to remove alkali from the low bottoms of the river. It is a low-growing species, and it is kept too busily at work to enable it to take the time to make its flowers large and gaudy, nor is it able to hold its head as high or to dress in the style of its taller and more aristocratic relatives of the species of Helianthus.

This entire region abounds in rare and peculiar forms of plant-life. A botanist could well employ a year's time in the county of El Paso. I know of no other short ramble that a botanist or a tourist could take and see so much of living nature that should interest and instruct him as a half-day's walk from El Paso up the Santa Fé Railway by old Fort Bliss to the smelter and back along the other railway to the city, especially if the walker on his return leave the railway when about a half-mile from the city, taking the wagon-road over the hills. He could see Acacias, the curious Screw-bean, Arrow-wood, Cassias, Willow Catalpa, Hymenoclea, Wislizenia, Biscutella, Daleas, Lepidium, Tribulus grandiflora, Martynia, Riddellia, Baileya, Janusia, many handsome and strange Grasses, and many more extreme western Texas and Mexican species.

La Junta, Colo. *E. N. Plank.*

Plant Notes.

Magnolia stellata.

THE flowers of all our native Magnolias open after the leaves expand, and some of the Asiatic Magnolias, like the beautiful M. hypoleuca, belong to the same class. But there is another well-known group of species and hybrids which form their flower-buds completely during the summer, and these open early in the spring before the leaves appear, when their abundant large flowers always make them objects of popular interest. The best known of these is the Yulan Magnolia, M. conspicua, a large shrub, or often a symmetrical tree, twenty-five or thirty feet high, which bears large lily-like, pure white flowers. M. Soulangeana has the same habit as M. conspicua, but smaller white flowers, streaked with purple at the base, which open a few days later. This is a hybrid between M. conspicua and M. obovata, a large shrub, with flowers cream-white within and deep purple on the outside. In its original form the latter plant is comparatively rare. M Lenné, a widely spreading bush, somewhat resembles it, and it may be a hybrid between M. obovata and M. conspicua.

Magnolia stellata, which was introduced from Japan nearly thirty years ago by Dr. Hall, after whom it is often called M. Halliana, is now becoming quite common, and its general form is well shown in the illustration on page 195, although, for some reason, the flowers were not as abundant this year as usual. This specimen stands on the grounds of the late Mr. Francis Jenkins, of Jersey City Heights, and was planted some twenty-five years ago. It is twelve feet high and has a diameter equal to its height. The flowers usually appear a week before those of the Yulan Magnolia, although at the right of the illustration there can be seen a portion of a plant of M. conspicua, which the warm weather this year hurried into bloom with M. stellata. The flowers of this species are pure white, three or four inches in diameter, and they have not the somewhat disagreeable odor of the other early-flowering species, but are delicately fragrant. The petals are narrow, and they spread out into a star shape, which justifies the specific name. The plant has good foliage and is interesting at all seasons. Besides its other good qualities it is perfectly hardy; it begins to flower when it is hardly two feet high, and it will flourish in any ordinary garden soil. Like all other Magnolias, M. stellata should be transplanted in spring after the growth has started. If the fresh roots are bruised earlier than this they are liable to decay, but the wounds will heal over readily when the vital forces of the tree are active.

Cultural Department.

Culture of the Garden Bean.

IF we study the characteristics and growing habits of both the dwarf and tall-growing or pole garden Beans, we shall find that while they are rapid growers and good feeders, with a root-system which can collect food from a drier and coarser soil than most garden plants will thrive in, they are not able to profit much from fresh and "unmatured" fertilizers, and will do best on soils which have been made rich by dressings applied during preceding years rather than the current one; also, that of the three elements of plant-food, nitrogen, phosphoric acid and potash, it is the last two which the Bean plant seems to find it most difficult to collect in sufficient quantities, so that application of these two elements, in such form and so mixed with the soil that the roots can readily take them in, is most likely to increase the yield and improve the quality of this crop. We shall also find that the plants are very susceptible to injury from an oversupply of water, particularly at the root, and a well-drained soil is essential to even a fair growth. Lastly, while the plants seem vigorous and are rapid growers under favorable conditions, there are few of our garden plants which are so easily discouraged and succumb so quickly to unfavorable conditions, or to any injury, particularly if it be to the root. The plant seems to lack recuperative power, and a mutilation of the root, which would be little more than a stimulant to Corn, Cabbage or Lettuce, will stunt or even kill a Bean plant.

If we keep in mind these characteristics of the plant we will be able to cultivate it more intelligently and with greater success. We should plant our Beans in the driest and warmest part of our garden. As early as possible in the spring the Bean plat should be thoroughly spaded and fined to the full depth of fertile soil; and unless it is already very rich, we should apply (after the spading) a liberal dressing of well-rotted manure, or a dressing of from four to twelve pounds of fine ground bone, and one peck to one bushel of wood ashes to the square rod. Care should be taken to spread the fertilizer evenly, and to work it well into the surface soil. A week or ten days later work the ground over again and repeat this deep and thorough cultivation every week or ten days until after the seed is planted and the first true leaves have appeared. After this the soil should be stirred or tramped on as little as possible, though any starting weeds should be destroyed by raking or shallow hoeing which merely cuts the surface. The secret of a good bean crop, either in the garden or field, as far as cultivation is concerned,

is to put the soil into the finest possible tilth before the seed is planted, thus avoiding the injury to the plant which would inevitably result from stirring the soil after it is filled with roots. The labor spent in preparing the soil for the crop is not wasted, for if it is well done there will be no need of later cultivation, and surely it is easier and cheaper to do all necessary cultivation before planting than after.

In garden culture it may be well to plant a few of the hardier and early sorts, like the Mohawk and Black-eyed Wax, quite early, but the bulk of the crop should not be put in until the ground is warm and settled warm and dry weather may be expected. Just after the fall of the early apple-blossoms is usually the best time to plant Beans. As the seed is usually of good vitality and so large as to be little liable to loss we should use only a few more seeds than we expect plants. A poor yield and a poorer quality is often the outcome of overseeding

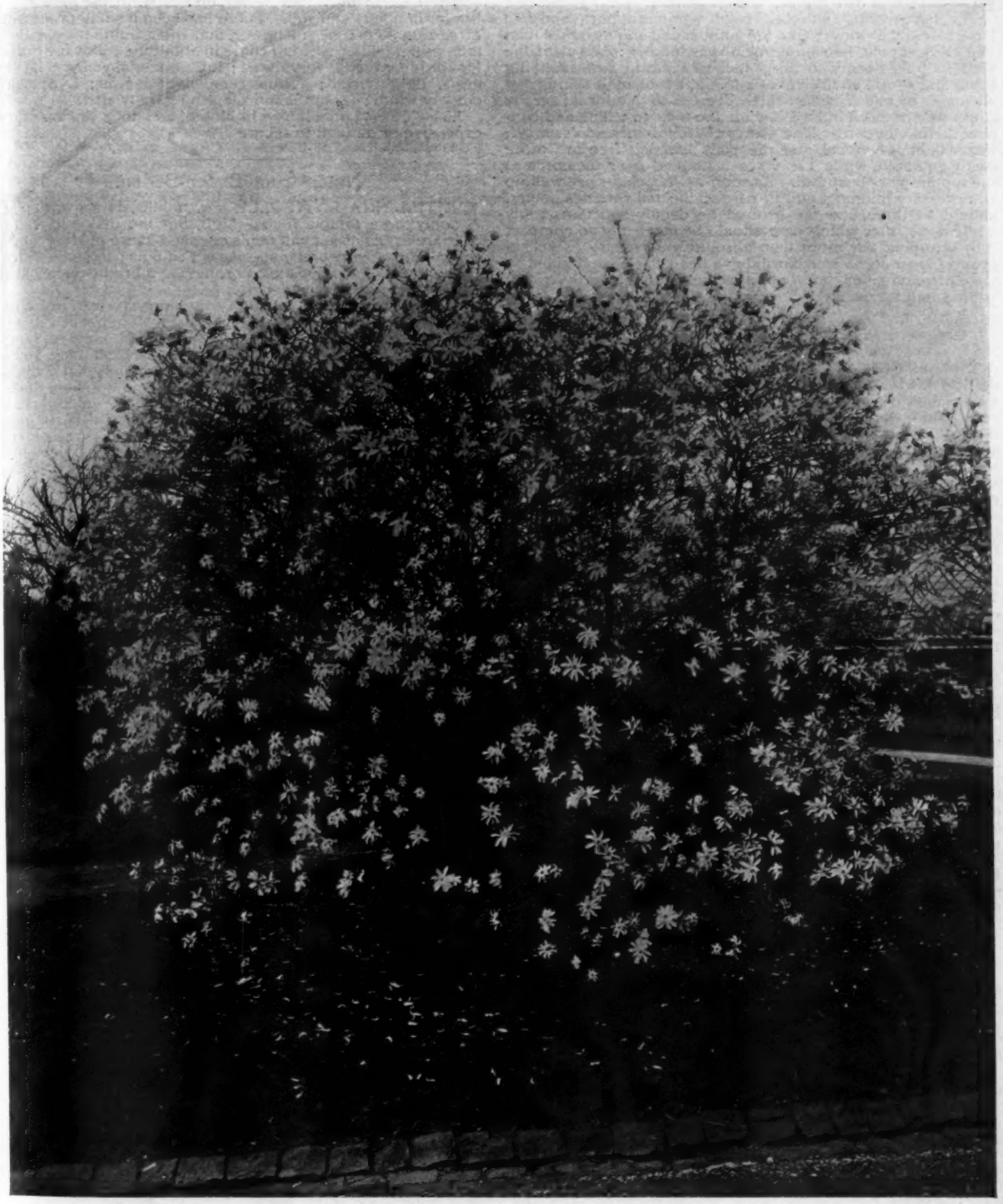

Fig. 31.—Magnolia stellata in a New Jersey Garden.—See page 194.

and consequent crowding. If the dwarf sorts are planted in drills a plant once in four to eight inches, or two once in about sixteen inches, are enough, and more than three to five plants should never be left in a hill. It is well to sow somewhat thicker than this and thin out as needed when the plants have formed the first true leaves.

The tall-growing varieties need some support, and we have found that they "take to" an inclined much better than to a vertical pole, hence our plan is as follows: We plant the seed in hills twenty to thirty inches apart in rows running north and south, and drive a six to eight foot pole slanting at an angle of about twenty-three degrees to the north; on the south side of each hill we saw off the tops to a line and connect them with cords. The plants will climb these poles much better than if vertical, and the pods hanging free are more easily gathered, while the vines festooned over the cords at the top are very beautiful. As soon as the plants are well up all necessary thinning, and in case of the tall varieties poling, should be done, and the ground be deeply and thoroughly cultivated; after which care should be taken not to compact it by tramping any more than absolutely necessary. In clean ground most of the weeds will have been started and killed by the early cultivation, but if any appear they should be destroyed while small by raking or hoeing.

Detroit, Mich. *Will W. Tracy.*

Flowers of the Season.

IT might be added to the recent note on Tulipa sylvestris that this is an excellent species to naturalize in the grass or wild places, owing not only to its vigor, but also to its peculiar root-action, which conducts the young bulbs away from the flowering place of the parent. Owing to this habit this Tulip spreads satisfactorily and continues in vigorous condition since it occupies new ground. Of course, it is necessary to plant in good open soil. Good forms of T. sylvestris are of a rich deep yellow, very fragrant and of a charming habit, the stems being slightly pendulous at first and only carrying the flower perfectly upright as it matures. T. sylvestris seems to be widely distributed, and it varies very much in size, though the smaller varieties may enlarge under good treatment. The best form in my garden is an Italian one from Dammann. The flowers are not much pointed and have green markings on the outer petals; they are of large size, quite in contrast with some recently collected ones which are not much larger than a Snowdrop.

Thanks to Holland, one can buy a beautiful display of color for very little money now, and the mixed Tulips of the catalogues should satisfy any owner of a garden not given to fads. However, a nice clump of some special variety or species is always satisfactory. If only one were to be chosen I would prefer Tulipa Greigi, which is the most brilliant in coloring, of fine form, and has handsomely variegated leaves. These are now becoming reasonable in price. Gesner Tulips pale before these, but are very satisfactory. I planted over my Tulips last fall some young plants of Arabis alpina, which covered up the bare earth, and the combination of the small white flowers under the Tulips was rather effective.

The Poppies have commenced to flower this week, led by Papaver alpinum, which seems less generally grown than P. nudicaule (the Iceland Poppy), one of its near relatives. The type has finely divided glaucous leaves, but does not differ in form of flower. There are yellow, white and red varieties, and some specially dainty ones which show just a suffusion of coloring in the white. These plants are perfectly hardy if their crowns are kept above the wet ground. It is better to sow seeds each spring. Seeds sown now will produce good flowering plants in late summer, and a majority of them will winter over safely the first year, at least, and be a delight at this time. The seedlings are not at all difficult to transplant if their long roots are borne in mind.

This is also the time of the Primroses, of which one never has too many. The modern strains of hybrid Primroses, of which Dean's is the best, are perfectly hardy and endure our warm summers, yet such is the uncertainty of the climate that last winter left me scarcely a plant alive. However, this may not happen again in another decade, and a new stock is easily grown from seed. This is a good time to start them, when their beauty is most persuasive. Primula cortusoides has wintered perfectly, the creeping rhizomes being frost-proof and the plants deciduous. They are graceful in flowering habit, but their reddish purple color is not pleasing.

Every one knows the big Crown Imperials, but I fear few know the beauty of the dwarf Fritillaries, many of which are now in flower. There is an endless variety of these plants, but one should commence with F. Meleagris, or Snake's-head Fritillary, which has large pendulous flowers, white or brown or reddish, the latter curiously checkered. The Dog-tooth Violet, too, is generally known, though its beauty is not fully appreciated. The California forms are, perhaps, not more beautiful than those of the east, but they differ in effect and are well worth attention. They do well with me in a moist border in a very stiff soil. There has been a small procession of rhizomatous Irises in flower, and their numbers are daily increasing. They seem to come in about the following order: I. rubro-marginata, very dwarf; I. Chamæiris, yellow; I. Olbiensis, dark purple; I. lutescens, light lemon; I. Statellæ, creamy white; I. pumila, purple, and variety alba.

These flowers are all now in bloom, and they are not rare, expensive or difficult to secure.

Elizabeth, N. J. *J. N. Gerard.*

Notes from Baden-Baden.

FRITILLARIA LATIFOLIA, var. nobilis, is a dwarf plant only three to five inches high, but the deep vinous-red bells are as big as a small hen's egg, and these enlarge under cultivation. A very pretty species is F. alpina; its small widening bells are of a chocolate color, having a bright deep yellow ring, making it very handsome.

Muscari azureum Freynianum is the largest form of azureum. It is very early and flowers here early in March, when its turquoise-blue spikelets make it very showy. M. elegans, newly introduced, has comparatively narrow and rather long spikes in shades of bright blue, with a tinge of violet. M. Szovitsianum subcœruleum is very striking, the pale sky-blue spikes giving it particular beauty. M. polyanthum, which I have introduced from Asia Minor, is somewhat late, but is, perhaps, the most showy of all. From four to six spikes come from one bulb, and these are very large, of a bright, deep and pure blue which at once attracts attention.

Iris Assyriaca is new and a showy species. It is a Juno of the Caucasica stamp, with ample foliage, and the flowers, of a milky white, or sometimes with a shade of blue, are produced in numbers all along the stem. From five to seven are open at once, and they last for three weeks.

Baden-Baden. *Max Leichtlin.*

Canna Notes.

TO thoroughly prove the capabilities of a Canna the necessary conditions must be provided. These are good soil, with cow-manure added, an abundance of water and plenty of space. Two wheelbarrow-loads of cow-manure are often allowed for a single bulb. One load should be spread on the top of the bed and the soil forked out, and another dumped in the excavation. The well-mixed soil should then be thrown back and the bed neatly finished for low-growing marginal plants. A pail of water in the morning and liberal spraying with the hose at night is advisable.

The season of 1895 added two more Cannas to our tested list. Antoine Chantin (Farquhar) proved highly satisfactory. Its habit is graceful, with abundant foliage of a light but vivid shade of green, which contrasts charmingly with the flowers. I know of no other Canna which produces so many blossoms to a flower-stalk. I have counted from six to ten lateral clusters on a single stalk, seven or eight of them in bloom at one time. The color is pleasing and true to the description given—cherry-salmon.

Geoffrey St. Hilaire was less satisfactory. It is a good strong grower, but stiff in outline, and the leaves are not so purple or chocolate-colored as we are led to suppose. The flowers are said to be deep orange or capucine-red. The shade of red is far from agreeable and out of all harmony with the foliage. Dark-leaved Cannas should never be planted near a highway if the hose is to be used, as dust from every passing vehicle settles and sticks remorselessly upon the wet leaves.

Pittsford Mills, Vt. *G. A. Woolson.*

The Lily Garden.

THE Lily borders on my ground are now offering the best evidence that the failures so often noted are caused by carelessness or by want of knowledge of the requirements of these plants. For many years I have advocated the practice of mulching Lilies deep enough to keep the frost entirely away from their bulbs, since careful experiments have made it evident to me that their hardiness is generally overestimated. It is frost, as I believe, which causes entire failure of many of the more beautiful sorts and seriously injures the most hardy ones.

In my experiments I have found it almost impossible to decide as to the method of planting which affords the greatest

satisfaction; whether in the mixed border, in groups, in beds with each variety kept separate, or in beds with all the species mixed without the slightest regard to class or order. For the past three years in our private garden we have adopted the latter plan, and in this way we have a Lily bed in which there are flowers from early in June until September.

Frost in winter and drought in summer are alike fatal in their results. All Lilies seem to like a loose moist soil which is well drained. Two of our native species, Lilium Canadense and L. superbum, grow freely in wet marshes or swampy grounds, their native habitat, but they both succeed better when planted in dry ground if properly mulched in summer, so that the soil is always moist and cool, and the same conditions best suit all other Lilies.

Our beds have been planted three years, the bulbs being placed singly about eighteen inches apart each way. They are a mass of strong-growing healthy plants; not a single variety has dropped out, and in many instances where but a single bulb was planted there is now a clump of six, notwithstanding that each spring all the small bulbs that form at the base of the stems the year previous have been removed. This plan should always be practiced, not only to increase stock, but to give the old bulbs all the plant-food within reach. The beds are covered about the first of December with coarse litter from the stable; we prefer that from the horse and cow stables mixed. This is put on to the depth of three inches, the paths between the beds being also covered to prevent the frost from working its way down from the outer edges to the bulbs. This has proved ample protection, and during the last six years the frost has never reached a bulb. L. auratum, which is generally considered a difficult subject to manage, has averaged three stems from a single bulb. Some of these are now (May 6th) two feet high and nearly three-fourths of an inch in diameter. Plants of L. monadelphum, which are quite as difficult to manage, are proportionately strong; L. Hansoni, which is provokingly slow to propagate, has this year nearly doubled in numbers, each stem being equally as strong as the single stems of last year. The delicate little Lilium tenuifolium and its nearly related L. Chalcedonicum are proportionately strong. Many of the latter will bear fifteen to twenty flowers on a single stem this year. Immense is the only word that fitly describes plants of L. speciosum. Last year we had forty flowers on a single stem, and this year we hope for what we have been trying for years to obtain—fifty flowers from a single spike. This is not from the Monstrosum section, a class we do not grow, leaving those for tastes that crave unnatural forms.

Lilium Brownii and L. Colchesterii produce flowers that for the brief period of their existence are equal to the best Lilies, and their near relatives, L. longiflorum and L. eximium, which are not reliably hardy, if the beds are only mulched so as to exclude all frost will thrive with as much vigor as L. tigrinum, which nothing can kill.

On the 10th of April we raked off the coarsest of the mulch, leaving the remainder, which is so fine as not to obstruct free growth of the more delicate kinds. As this is carried into the soil by the rains, we shall add more, using only that which is well rotted and fine. This is the only cultivation given, and all that seems required. We find the less we stir the earth the better, as the whole surface of the bed is a mass of fine roots, and anything which disturbs them injures the plants, not only for this year's production of flowers, but for the development of the bulbs, upon which future success depends.

Floral Park, N. Y. *C. L. Allen.*

Saxifraga crassifolia.—This is one of the best of earliest-flowering hardy plants. The leaves are from six to eight inches long by four wide and obovate in outline. The flower-stalks rise directly from the root-stock, and the flowers, which are of a deep pink color, are borne on a thyrsoid panicle. This plant is used largely for spring bedding in England, and when set among blue and white Dutch Hyacinths the effect is very good. The large leaves of the Saxifrage give furniture to the beds and help to keep the soil cool and moist, thereby prolonging the flowering season of the Hyacinths. As this Saxifrage is quite hardy it may be used effectively for the same purpose here. It is easily propagated by division of the root, or by seed, which should be sown in the greenhouse early in February, and the seedlings grown on all summer for planting in the beds in the fall. We have another Saxifrage here which I have always known as S. cordifolia. The leaves are somewhat larger and heart-shaped, and come into flower about ten days later than S. crassifolia. According to *Index Kewensis* these two species are now considered identical, though they appear to be sufficiently unlike, horticulturally at least, to be distinguished by different names. Both are natives of Siberia.

Menyanthes trifoliata.—This pretty subaquatic or bog plant is now in flower, April 29th, on the edge of an ornamental pond in this garden. The stems are prostrate and the leaves trifoliate, with sheathing petioles. The flowers are borne on erect spikes from nine to twelve inches long. The individual flowers are white, with beautifully fringed petals, and are about half an inch in diameter. It belongs to the Gentian family, and is commonly called the Buckbean.

Stylophorum diphyllum.—This plant may well be considered as a standard herbaceous plant. It is one of the earliest to flower, and continues on well into the summer. The fistulate stems rise above the foliage, and the flowers are borne in an umbel at the summit. They are bright yellow, about two inches in diameter. Most of the leaves are radical, pinnatifid, and about one foot long. The stems have two opposite leaves just below the flowers, from which the specific name is given. It is easily propagated either by seed or division of the root.

Botanic Garden, Northampton, Mass. *Edward J. Canning.*

Pampas Grass.—Last spring we raised some plants of Pampas Grass from seed, about a dozen in all. As soon as they could be handled they were put into thumb pots and then into three-inch size, and subsequently planted out along with other grasses. In the fall they were lifted and divided up into as small pieces as possible, put in three-inch pots, kept in a cool house and potted on and divided again, until now there are about a hundred nice healthy plants in four and five inch pots. They make their thick succulent roots so rapidly that it is surprising how soon they fill the pots. In this section of the country the plants occasionally get winter-killed if left unprotected. A good way to protect old plants is to place over the crowns old cement barrels with the ends knocked out and fill them up with dry leaves. This protection will carry them safely through very severe winters.

Viola pedata.—The Birdsfoot Violet is probably the showiest of our many beautiful native Violets, and the ease with which it is cultivated should make it quite a favorite among spring-flowering plants. The plants succeed well in soil just the opposite to that in which they grow in their native haunts. In this locality Viola pedata is found principally in sandy vegetable mold, but in a border of heavy wet loam in which I put several plants three or four years ago, it thrives and flowers well. Of the three distinct forms which I have met in a wild state the commonest is the variety Bicolor, with the two upper petals very dark purple, the under ones pale lavender; this variety is especially showy. The monoçolored form has the petals much the same color as the under petals of Bicolor. The third form is by no means common; the colors are rather startling, the two upper petals being dark, as in Bicolor, with the lower ones pure white. This is a shy bloomer and does poorly under cultivation. In a fully exposed part of the rock-garden here several pockets are given up to their cultivation. The soil provided is the same as that in which they grow naturally. Every year young plants come up thickly from self-sown seed. These are weeded out, as the old plants remain quite vigorous year after year. On the approach of hot weather the plants are given a top-dressing of leaf-mold annually, and for two or three weeks the display of bloom is gay.

Botanic Garden, Washington, D. C. *G. W. O.*

Tussilago Farfara.—This imported weed, commonly called Coltsfoot, has given me much satisfaction as an ornamental plant since it possesses much beauty and fills an important place in the flower garden. Some years ago I planted several of these plants upon an embankment of red clay, sand and muck on the north side of one of the wings of the house, where it was exposed to the direct sunshine only in the afternoon. The plants speedily clothed the embankment, densely covering it with large tropical-looking foliage all summer long, while in March or April, before a leaf appears, it sends up many scaly stems five to eight inches long, bearing handsome rich yellow heads of flowers nearly an inch across, but fully open only in the sunshine. Besides, it endures our severest droughts and looks flourishing and healthy all summer long. It should, however, receive some protection in winter, as every part of the prostrate rhizomes, or root-stems, left uncovered is sure to be killed if exposed to the freezing and thawing of our changing winter, and this will be sure to destroy many of the curious flower-buds which form in autumn. All the parts covered, however, will be sure to live. The flowers are really pretty, but its foliage is its chief beauty. The leaves rise on long (eight or ten inches), thick purple stems, and attached directly to the creeping rhizome, or root-stalk, and are at first covered by a dainty covering of wool, which soon dis-

appears, and the leaves become of a beautiful rich shining green, with purple veins, round and broad, heart-shaped, angular, their greatest breadth equaling their length—that is, from six to eleven inches where broadest. I know of no low-growing plant that produces such a rich mass of large tropical-looking foliage. I heartily recommend this plant for densely covering embankments, slopes, stream or lake borders, where the soil contains clay, sand and muck or rich loam. But it should exclusively occupy the ground where planted, as it will crowd everything else out.

Rochester, Mich. *Wilfred A. Brotherton.*

Correspondence.

The California Frosts.

To the Editor of Garden and Forest:

Sir,—The mean temperature of February was five degrees above the normal, while the mean temperature of April has been five degrees below normal. We have had very severe frosts in nearly all parts of the state, and, of course, vineyards, orchards and gardens have suffered. It will be impossible to determine the exact extent of the loss for a fortnight or more, but the best authorities think that the cherry crop of the state is lessened one-half. Almonds and Apricots also have suffered severely. Contracts are being made for wine grapes, delivered in autumn, at something like three times the price offered a month ago.

I lately visited the Sacramento Valley. At Chico I found that the crop of the famous Bidwell orchards was practically destroyed, excepting peaches, half a crop, and apples. Even the vegetable gardens in this district have suffered so severely that in some cases replanting several times over became necessary. One orchard of two hundred acres of large Almond-trees will not produce enough this year to pay for picking.

The spring frosts have not yet seriously injured the Citrus fruits, so far as I can learn; it is the deciduous fruits which have suffered most. Prunes have escaped fairly well in many cases; some districts will have a very light crop, and much fruit may yet fall from the trees. There is hope, of course, that higher prices may be the result, and so the net yield of many orchards will be kept up to the average, but the fruit-growers feel discouraged over the outlook.

The truth is, that California, like all other places, has fluctuating seasons, and if we plant immense areas in fruits, often without any scientific study of the locality in question, we must, of course, learn by experience. There are all kinds of climates here, some of them adapted to a wide range of vegetation. The chief characteristics of the climate of the leading horticultural districts are dryness of atmosphere and coolness of the nights.

The southern states excel California in raising sweet potatoes, melons, cotton and many other crops which require a moist, warm atmosphere. Cassava, sugar-cane and rice do not thrive as well in any part of California, so far as tested, as in the warmer coast regions of the southern states. Occasionally enthusiastic Californians attempt to introduce Cinchona into cultivation, or Coffee, Vanilla, the Cocoa Palm or Pineapples, but without success. Even our mildest and most perfect climates are fortunately far removed from the *tierra caliente* type. Every part of California is subject to the influence of our great mountain ranges. In ten thousand valleys and sheltered nooks up and down the Coast Range, or along the giant Sierras, vineyards and orchards are and will be planted in spite of occasional trying seasons which determine unfit locations, and readjust the industry to actual climatic conditions. New orchards will be more wisely planted; unprofitable orchards will be grafted over, or will give place to other crops. Different districts will settle down to the production of whatever fruit they can best produce, and we shall no longer hear, as now, of hundred-acre orchards of Apples, Peaches, Prunes, Cherries, Almonds or Walnuts, planted where the Apple, Peach, Prune, Cherry, or whatever else it may happen to be, is foreordained to be an uncertain crop. There is enough suitable land in California for all these industries, but it necessarily takes a good many years to trace out the minor isotherms.

Niles, Calif. *Charles H. Shinn.*

The Evonymus Scale in Japan.

To the Editor of Garden and Forest:

Sir,—In the Report of the Department of Agriculture for 1880, Professor Comstock described Chionaspis evonymi, which had destroyed nearly all the shrubs of Evonymus latifolia at Norfolk, Virginia. At that time it was supposed to occur also on Orange, but this proved to be an error, the species on the Orange being distinct. More recently the Evonymus scale has appeared on cultivated Evonymus in Europe, and in Italy economic entomologists have been at some pains to devise methods for its destruction.

Mr. Craw now sends me some twigs of the Japanese Evonymus on which are numbers of the same scale, mixed with a few Aspidiotus rapax. The plants arrived from Japan, and were destroyed by Mr. Craw in his capacity of horticultural quarantine officer. The occurrence is of peculiar interest, as showing the probability that Japan is the true home of this destructive scale.

While writing I may mention that Mr. Craw also sent a leaf of Aspidistra on which were many Aspidiotus ficus. It was from Osaka, Japan; 850 plants were destroyed. This insect is well known in America also, but it is a matter of special interest to note that very many of these scales from Japan show from one to three parasite holes, indicating that A. ficus has an important parasite in that country which it might be well to introduce here.

Agric'l Experiment Station, New Mexico. *T. D. A. Cockerell.*

Notes from West Virginia.

To the Editor of Garden and Forest:

Sir,—On the landscape-gardener devolves the delightful task of helping Nature to make beautiful pictures of our homes. Here, in amateurish fashion, we try to imitate his work and devise harmonious effects each year.

By the front piazza is a group now in luxuriant bloom, consisting of the pink and white varieties of the double-flowering Almond, with clumps of Mertensia Virginica from a neighboring pasture-field, hiding the stems of the shrubs which are apt to be bare and unsightly. The lovely shades of pink and clear blue are relieved by the pure white of the Snowy Almond, and there are no high colors near to mar the effect. But the salient features of the garden now, on this second day of May, are the large-flowering Dogwoods, mingled with Red-buds, against a dark background of Cedar; the groups of flowering Apples and Cherries, and the beautiful mass of Exochordas and Xanthoceros in a prominent position on a little knoll. All this conspicuous bloom, together with many handsome red and white Japan Quinces and white Spiræas and a few white and purple Magnolias, is making the grove a lovely wilderness of flowers.

The rock-garden is very fascinating and has taught me many lessons of late. I have learned that Alyssum saxatile, Santolina and some other herbaceous perennials disappear in winter in a stiff clay soil, and that Hellebores cannot resist our hot, dry summers without plenty of watering. I have had reluctantly to give up the whole charming Heath family, with its beautiful Andromedas, Kalmias, Rhododendrons and Azaleas. They refuse to be happy in our most carefully prepared beds of peat and rich mealy loam. Our dry summers wither them, our winter suns scorch them, and they pine and dwindle and disappear. Only one member of the family remains with us, and that without special care. This is the fragrant Clethra alnifolia. I used to think I could, by constant care, keep Rhododendrons in comfortable health. They did not increase much in size, but they bloomed for me as long as they lived, though that was not a long period, and constant renewals were necessary to keep their border presentable. Now the last lingerer has vanished from Rose Brake, and they are among our extinct species.

But if Rhododendrons despise our stiff clay soil, Roses revel in it, and Pæonies thrive amazingly on the strong food we give them, and a multitude of beautiful plants are hurrying forward to fill up the vacancies in the shrubberies. Nature will not grow everything everywhere, and that is just the reason that each locality has its own distinctive charm.

Shepherdstown, W. Va. *Danske Dandridge.*

Maple Sugar in Vermont.

To the Editor of Garden and Forest:

Sir,—The maple-sugar season of 1896 in Vermont began under difficulties. In many cases the weather made pleasant promises early in the season, which it failed to keep. Nearly all sugar-makers tapped their trees during the first week in April, and some as early as March 25th. But the cold, raw winds of succeeding days greatly interfered with the sap-flow. Later, however, the weather turned warmer, and for a week or two sugar-makers had all the sap they could handle. Some who have large sugar-orchards were forced to work nights as well as days. The season, as a whole, was much shorter than

usual, the bulk of the sugar having been made up within ten days. By April 15th most makers had finished, and by the 20th all were through.

The crop is probably below the average in quantity, but is said to be considerably above the average in quality. Constant improvement in methods and facilities of manufacture of itself tends to raise the quality of the product year by year. The use of improved evaporators gives cleaner and lighter-colored sugar than could be made in the old-style kettles; and the prejudice against the lighter-colored article is rapidly disappearing. It is probable that, without reference to this year's crop, the quantity of maple sugar made in Vermont is on the increase. The increase comes both from the working of a larger number of trees and from better methods of manufacture.

The prices realized for sugar and syrup vary greatly in different parts of the state and at different seasons. Some of the first sugar put on the market brought the makers sixteen to seventeen cents a pound, while a great deal was sold in the country markets at seven to ten cents. Probably the bulk of the crop sold up to date brought the makers ten to twelve cents. Syrup sold generally at from sixty to ninety cents a gallon, though many makers put their best product up in one-gallon cans and sold on private markets at $1.00 a gallon.

The Vermont farmer feels that his sugar orchard is one of his best pieces of property. It has been estimated that such property pays an annual dividend of ten to twelve per cent. on the investment. Whereas a few years ago there was quite a tendency to cut Maple-trees and clear away the sugar orchards, the present feeling is rather to encourage the extension of the maple-sugar industry. Vermont is proud of the high standing which her maple sugar has achieved in the market, and she gives hearty support to the laws which enable her to give constant assurance that the standard will be maintained.

Last year's run of sugar was also somewhat below the average, which is probably about 15,000,000 pounds, not counting syrup. This is greater than the output of any other state in the Union.

There are a great many Red Maples throughout the state which are sometimes tapped without distinction between them and the true Sugar Maples. Some makers are really unable to distinguish the two species. Others consider both equally available as sugar producers. Still another faction consider the sugar of the Red Maples inferior and do not tap the trees, though they may be thickly intermixed with the true Sugar Maples which are being tapped. The preponderance of opinion seems to be against admitting the Red Maple to a full equality with the Sugar Maple as a sugar producer.

University of Vermont. *F. A. Waugh.*

Trees and Shrubs in Flower at Germantown.

To the Editor of GARDEN AND FOREST:

Sir,—I am writing on the 8th of May, and trees and shrubs are much farther advanced than usual at this date. The first Pear-blossoms rarely open before the 5th of May. Now the petals have all fallen and the fruit is quite perceptible. The various varieties of the common Lilac, Syringa vulgaris, are now at their best, but this is little in advance of their usual season. The plant here that most deserves special mention, however, is Ungnadia speciosa, the Spanish Buckeye, which is now flowering here, and perhaps it has never flowered out-of-doors before so far north as this. Our plant came from Texas some ten years ago, and it has been killed almost to the ground every year, although it started up again vigorously each spring. For some reason it went through last winter without any protection, and is now flowering finely. The rose-colored flowers are large and handsome, opening in pairs, with two or three pairs clustered together. Unlike other Buckeyes, its leaves are pinnate, and the young shoots remind one of the Walnut as they burst forth. It becomes a tree of considerable size in some parts of Texas, and, no doubt, with some protection it could be made to flower in this latitude every year. Other trees and shrubs in flower which attract attention now are the Paulownias, the beautiful Magnolia Fraseri, the Silver-bell Tree, some of the Thorns, our native Crab, the Flowering Dogwood and its varieties, Viburnum Lantana, Xanthoceras, the rare Neviusia from Alabama, Exochorda, sometimes called the Pearl Bush, a near relative of the Spiræas; Rhodotypus, Kerria, Spiræa Thunbergii, which is almost past its best; S. prunifolia and S. Van Houttei, which is just in flower; the Tartarian Honeysuckle and some of the early-flowering Tamarisks and the hardy Azaleas. The list, however, could be made twice as long.

Germantown, Pa. *Joseph Meehan.*

Recent Publications.

Hand-list of Coniferæ grown in the Royal Gardens at Kew.—Students and cultivators of coniferous trees will find this hand-book a helpful guide to the plants cultivated in the Royal Gardens, and a useful key to the synonymy and geographical distribution of the species of this most important order. Two hundred and twenty-seven species, with 340 varieties, belonging to thirty-seven genera, are enumerated. In the preface, which was prepared by Sir Joseph Hooker, who for more than half a century has devoted special attention to the study of these plants, we learn something of the increase of knowledge with regard to them. Of the Abietineæ, Linnæus, in 1753, knew but ten species, all of which were included under his genus Pinus. In 1789, when the first edition of Aiton's *Hortus Kewensis* appeared, the number of known species had increased to nineteen; in 1841 the number had increased to fifty-two, and in 1866, when Parlatore published his classical monograph of the Coniferæ in De Candolle's *Prodromus*, one hundred and sixty-two species of Abietineæ are described.

Among some of the interesting plants in the old Kew Pinetum is a specimen of Ginkgo biloba, introduced in 1754, and originally trained against a wall like a fruit-tree. The Deodar, Cedrus Deodara, was introduced in 1831. It has not proved satisfactory at Kew, and has disappointed the expectations formed of it, while the Mount Atlas Cedar, Cedrus Atlantica, grows with great rapidity. One of the most conspicuous trees in the garden is a specimen of Pinus Laricio, planted in 1825 and still in good condition.

The value and interest of the Kew collection of conifers is greatly increased by the facilities afforded by the temperate house for growing to a large size representatives of genera which are not hardy in the English climate, like the Araucarias, the New Zealand, Malayan and New Caledonian species of Agathis, a genus related to Cunninghamia and Araucaria, and the Tasmanian Arthrotaxis, Tetraclinis, Callitris and Actinostrobus, Widringtonia Whitei, the Milanji Cypress, from the mountains of eastern equatorial Africa, an interesting timber-tree probably of great economic value, the Fitzroyas of Tasmania and Patagonia, and several others.

Some idea of the richness of the Kew collection in hardy conifers will appear in the fact that twenty-six varieties of the common Picea excelsa, or Norway Spruce, are cultivated, while of the ordinary Yew no less than thirty-seven garden varieties are enumerated. The arrangement of the genera and the names and synonymy are those now generally adopted by Dr. Masters, the learned editor of *The Gardeners' Chronicle* and the English authority on conifers.

The value of the Hand-list, which is sold in the Royal Gardens for threepence, is very greatly increased by a full index of the names and synonyms of all the plants which it enumerates.

Notes.

Professor William Saunders, Director of the Experimental Farm in Ottawa, has received the degree of Doctor of Laws from Queen's University for work done in advancing agricultural science and for work of a similar character in connection with the Royal Society.

Now is the time for beginning work against the Elm beetle, and all persons who have any responsibility for trees in public grounds or private places should prepare at once for an active campaign. The Town Improvement Association of Plainfield, New Jersey, did a timely thing last week by inviting Mr. Southwick, Entomologist of the New York Park Department, to deliver a lecture, with illustrations of the most dangerous insects and the most approved machinery for holding them in check. If the people of Plainfield follow Mr. Southwick's plain directions they will not be lamenting over the defoliation of their street-trees this year.

The early-flowering bush Honeysuckles, like Lonicera Standishii and its near ally L. fragrantissima, whose odorous

flowers appear before the leaves, opened here fully a month ago, but just now L. Morrowi is covered thickly with its little white flowers somewhat in advance of the Tartarian Honeysuckles. This is a beautiful plant, and later on it makes a fine appearance when in fruit, although, perhaps, not quite as interesting in late June as L. Ruprechtiana with its dark red bloom-covered berries. These two are among the very best of garden shrubs for this latitude, being perfectly hardy and of admirable shape and easily propagated. L. Morrowi comes from Japan and L. Ruprechtiana from Manchuria.

The single-flowered form of Pæonia tenuifolia is rare in gardens, although, like many other single-flowered Pæonias, it is handsomer than the double-flowered variety. The segments of the leaves of the single-flowered P. tenuifolia are rather broader than those of the plant more generally grown, which is also beautiful in form and color. Both are perfectly hardy, and once planted they need only ordinary care to flower abundantly every spring. Another beautiful flower which is rather ahead of its time is the Satin Flower, Ornithogalum nutans, a plant of the Lily family, with a raceme of half a dozen nodding bell-shaped flowers an inch long with white perianth segments flushed with pale green without and shining like satin within. It is an old-fashioned flower and it does not deserve the neglect into which it has fallen.

Professor W. F. Massey writes to *The Southern Planter* that he begins to doubt whether the Albemarle Pippin is simply the Newtown Pippin modified by soil and climate. During last winter he has had winter apples sent from the best Pippin-growing region of Albemarle, produced by trees which had been brought from the north. They were not identical with the genuine Albemarle Pippin, but were distinctly the northern Newtown Pippin. He thinks there is danger that the growers of what is known as the Albemarle Pippin will lose their prestige if they continue to get Newtown Pippin trees from northern nurseries and plant them in the hope of getting Albemarle Pippins. The only safe course, he thinks, is to propagate from the original Ragged Mountain stock and consider the apple as a distinct variety. Whether it is so or not is a matter for pomologists to discuss. If the two varieties are not distinct he believes that it will take generations to change the northern form to a genuine Albemarle Pippin. He adds that Wine Saps and York Imperials grown in the Piedmont country are becoming the most popular apples in the northern and foreign markets, and that both in Virginia and North Carolina there are thousands of acres where these varieties can be grown, to one acre where the Albemarle Pippin will thrive.

Some time ago we published an article relating to the appreciable drying up of the small lakes of Minnesota and of South Dakota. From this it appeared that throughout the whole area of these states the larger lakes had diminished in volume, and the smaller ones have dried up. The monthly *Weather Review*, published by the Department of Agriculture and edited by Professor Cleveland Abbe, in speaking of these facts, says that the average rainfall for ten years past may have been slightly below the normal in these states, but not so much below as to justify the conclusion that this change in the lake levels is due to any great change of climate or meteorological condition. The true reason for this drying up of the lakes is said to be the cultivation of the soil and the artificial changes in drainage. Every acre of virgin prairie plowed up and cultivated begins to evaporate into the air the moisture that it formerly held, every new drain that is dug helps the water that once settled in the soil to flow off into the river. Agriculture begins with an effort to drain rich lowlands that are too wet and ends by artificially watering the dry uplands and warm lowlands—that is, we begin by evaporating and draining off the water that we eventually wish to get back again. To all this it may be said that the advocates of underdraining uplands claim that this practice by changing the texture of the soil and in other ways actually leaves more available moisture for the roots of crops than could be found in the same soil before the drains were laid. That is, it is held that underdraining is a good defense against drought.

Professor John B. Smith, of the New Jersey Experiment Station, writes to *The Rural New-Yorker* that he is about leaving for California to study the character of the ladybird beetles, which feed on scale insects in general and upon the San José scale in particular, so as to determine which of them offer the best chance of surviving in the east. When he has selected the California insects he will distribute them at different places in New Jersey and in Florida, and colonies will also be sent to Maryland and Virginia, so as to give these insects from the Pacific coast as many chances of becoming acclimated as possible. It may be that they will survive without any trouble in Florida, and from Florida colonies can be easily sent north. If they survive in Virginia it will be easy to select specimens to send to New Jersey hereafter, and the chances are that each generation will become a little better fitted to sustain our changeable climate. The reason for all this is that the San José scale, introduced irom California some years ago, is increasing rapidly in the east, and no applications have been as yet successful in arresting their progress. On the Pacific coast there are natural enemies like the ladybirds introduced from Australia, which hold the scales in check, and although there are many difficulties in the way of introducing insects from one climate to another where they differ so widely as the Pacific coast climate and our own, still there is ground for hope that some species, if properly selected, might endure our climate. At any rate, it is worth trying, and the Legislature of the State of New Jersey, at the request of the Board of Agriculture, appropriated last winter a thousand dollars for the experiment. Professor Smith's mission and its results will be watched with interest.

Bidwell peaches, from Florida, the first of this fruit seen this year, were sold here on the 7th instant, and now command $1.00 to $1.25 a dozen at retail. Peaches from New York state hot-houses, the white skin beautifully marked with pink, cost from $2.00 to $10.00 a dozen in boxes holding six neatly wrapped fruits. Cherries, from California, are coming in limited quantities, owing to injury to the crop by frost, and not in the best condition, but are of fair size and color. They cost $1.00 a pound. The first cherries of the season from North Carolina reached New York on Monday, but were small and unattractive, and met no demand. Richly colored strawberries, from Charleston, of large size, long and green at the tip, on Saturday sold for thirty cents a quart box at retail, and the first Downings, from Maryland, more spherical and even deep red in color, brought twenty-five cents. Cups of Sharpless strawberries, from near-by hot-houses, containing a dozen immense fruits, cost fifty cents, and smaller berries twenty cents. These are decorated with their own foliage. Navel oranges, from California, may still be had for seventy-five cents, and grape-fruit, from Jamaica, for $1.00 to $2.00 a dozen. Limes cost from thirty to fifty cents a dozen. Shipments of Jamaica oranges continue, and one steamship last week discharged 228 barrels of this fruit at this port, besides 14,000 cocoanuts. Porto Rico pineapples of the largest size, with luxuriant tops and three to six heavy shoots at the base, command seventy-five cents each. Lychee nuts are seen in all the best fruit-stores, and, more rarely, cocoanuts in their outer shell, and Brazil nuts in round shells five inches in diameter, each enclosing from eighteen to twenty-four individual nuts closely packed together.

The windows of the uptown flower-stores still make attractive displays of choice flowers in simple and harmonious arrangements. One window of the four in one of the best establishments, on Saturday, showed half a dozen small vases containing loose, graceful masses of the yellow Sweet Sultan, Centaurea moschata, the clear lemon-fringed flowers standing out effectively above the Asparagus with which the floor was loosely carpeted. The only other decoration in this window was an immense bronze vase bearing a mass of the bold and striking Parrot tulips, with their confusion of rich yellow, green and crimson splashes and stripes, relieved by handsome glaucous foliage. Neat and tasteful flat bamboo baskets in their natural color, for orders for cut flowers, were displayed by another firm. Here the clean and cool-looking white tile flooring made a suitable summer relief for vases of Moss rosebuds, a bright mass of Meteor roses, sprays of flowering Almond and Dogwood, and boughs of Apple-blossoms. The most conspicuous flowers were clumps of late single crimson tulips, with purple-black markings at the base of the petals. Other showy exhibits were groups of light gladiolus, the bright red Pæonia tenuifolia, and William Scott, Tidal Wave and Helen Keller carnations, while among less showy offerings were the delicate white blossoms of Swainsonia, the yellow-flowered Alyssum saxatile, lily-of-the-valley, handsomely marked pansies, violets and sweet peas. The excessively hot days in April forced hot-house plants into early and profuse flowering, some kinds being urged six weeks ahead of the rightful season. Except in the case of carnations, which had been in scant supply, a glut naturally followed. Now that this is past there is sufficient scarcity of roses and some other cut flowers to hold up wholesale prices, and the season for flowers grown under glass will undoubtedly be shortened.